

PATENT SPECIFICATION

NO DRAWINGS

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COMPLETE SPECIFICATION

Treatment of Aluminium and Aluminium Alloy Powders

We, FOSECO INTERNATIONAL LIMITED, a British Company of 285, Long Acre, Nechells, Birmingham 7, England, do hereby declare the invention for which we pray that a patent may be granted and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to the treatment of powdered aluminium or aluminium alloys.

Powdered aluminium is of value for various industrial purposes. One particular use is described in Copending Application No. 8223/66 (Serial No. 1079535) which describes *inter alia* an anti-scale paint which comprises aluminium metal in powder form, refractory zinc or magnesium oxide or a compound yielding the same on heating (e.g. magnesium carbonate), a liquid medium, a suspending agent to aid in the suspending of the solids in the liquid medium and a binding agent. These paints are of particular value in application to objects of iron and steel. The liquid medium of the anti-scale paint is most conveniently water and by reason of the presence of magnesium oxide the final paint is generally alkaline in reaction.

It is well known that aluminium surfaces naturally acquire a thin oxide film which is comparatively impervious and serves to protect that surface against further oxidation. At normal temperatures the thickness of this film is only of the order of 0.01 microns, though this may be increased to 0.1—0.2 microns when the aluminium is heated to 600°C in air. Whilst such an oxide coating adequately protects the surface in dry air, slight discontinuities do exist and further oxidation can take place in aqueous media. It is established that aluminium is not attacked in aqueous medium to any significant degree if the pH is between 5.5.—7.0. However, slight variations in pH beyond such limits tend to rapidly

increase the rate of attack by the aqueous solution.

It follows from the foregoing that in an anti-scale paint such as that described above the aluminium is highly reactive.

It is an object of the present invention to render powders of aluminium or aluminium alloy less reactive by providing on the particles of aluminium a surface layer, a few microns thick, of aluminium oxide.

According to the present invention there is provided a process for the treatment of powders of aluminium or aluminium alloy to render such powders less chemically reactive which comprises subjecting the powdered aluminium or aluminium alloy to treatment with an aqueous solution of an oxidising agent at a temperature of at least 70°C, rinsing the product with water and then boiling it in an aqueous solution of an alkali metal silicate. The treatment with the oxidising agent builds up on the aluminium particles a surface coating of aluminium oxide with a thickness up to 10 microns or more, usually at least 2 microns.

The process of the invention may be carried out using a wide variety of oxidising agents, e.g. chromic acid, nitric acid, chromates, dichromates, alkali metal nitrates, potassium permanganate or hydrogen peroxide. The stronger oxidising agents are preferably used in more dilute solution. The expression "aqueous solution of an oxidising agent" does not include water *per se*.

The following Example will serve to illustrate the invention:—

EXAMPLE

Aluminium powder of particle size 75—150 microns is agitated for 5—20 minutes, preferably 15 minutes, in a 0.4% by weight aqueous solution of potassium chromate at

90—100°C. The liquid is then decanted from the aluminium particles and is replaced by hot water, (ca. 70°C) which is again decanted or filtered off after agitation. This is followed by boiling the particles in water and further decantation or filtration. Finally, the particles are boiled in a 5% by weight aqueous solution of water glass (soluble sodium silicate). During this treatment the oxide appears to grow in a columnar manner with bridges eventually forming across the columns, entrapping a small amount of chromate solution between the columns and beneath the bridges. The treatment with water and sodium silicate completes the sealing by bridges. The retained chromate serves the useful purpose of conferring self-healing properties on the oxide film; should abrasion rupture the oxide skin, the chromate causes its reformation.

20 WHAT WE CLAIM IS:—

1. A process for the treatment of powders of aluminium or aluminium alloy to render such powder less chemically reactive, which

comprises subjecting the powdered aluminium or aluminium alloy to treatment with an aqueous solution of an oxidising agent at a temperature of at least 70°C, rinsing the product with water and then boiling it in an aqueous solution of an alkali metal silicate.

2. A process according to claim 1 wherein the oxidising agent used is selected from chromic and nitric acids, chromates, dichromates, alkali metal nitrates, potassium permanganate and hydrogen peroxide.

3. A process for the treatment of powders of aluminium or aluminium alloys substantially as hereinbefore described with reference to the foregoing specific Example.

4. Aluminium or aluminium alloy powder whenever treated by the method hereinbefore described and claimed.

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